

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION OF

MILLER et al.

Group Art Unit: 3643

Appln. No.: 10/806,223

Examiner: K. ROWAN

Filed: March 23, 2004

Title: COUNTERFLOW INSECT TRAP

* * * * *

DECLARATION TRAVERSING REJECTIONS UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I am the President of American Biophysics Corporation ("ABC"), which is the assignee of United States Patent Application No. 10/806,223 ("the '223 application"), entitled Counterflow Insect Trap. ABC is engaged in the manufacture and sale of insect traps, and in particular of innovative insect traps embodying the subject matter claimed in accordance with the '223 application.

Included below as Table 1 is a list of insect traps (branded the "Mosquito Magnet") sold by ABC between March 1998 and September 2004.¹ A total of 652,641 traps have been sold during that time period. From the chart, it is evident that sales have increased each year from 1998, despite the introduction to the marketplace of several competing brands of traps.

The innovative insect traps sold by ABC were constructed according to the disclosure and claims of the '223 application. Specifically, these traps are covered by independent claims 1, 24, 39, 50, 83, and 112, as well as many dependent claims, including but not limited to dependent claims 22, 71, 78-82, 84, 105, 111, 113, 122, and 123. The traps sold all use innovative technology to attract and capture insects and are especially effective at trapping blood-seeking insects such as mosquitoes, no-see-ums, black flies and sand flies. The traps range in price from about \$260.00 to about \$1,395.00.

¹ The years set forth in the table reflect ABC's fiscal years, which run from October 1 to September 30, as opposed to the calendar years. For example, ABC's fiscal year for 2000 runs from October 1, 1999 to September 30, 2000.

Specifically, ABC's Mosquito Magnet sales are shown below in Table 1:

1998-2004 Unit Sales

	1998	1999	2000	2001	2002	2003	2004	Total	Retail \$
PRO Plus	0	0	0	0	0	0	6,321	6,321	\$1,395
PRO	75	582	3,825	15,913	27,915	22,895	13,368	84,573	\$1,295
Freedom	0	0	835	15,759	18,193	337	127	35,251	\$795
Liberty Plus	0	0	0	0	0	0	47,305	47,305	\$695
Liberty	0	0	0	0	60,422	93,140	69,376	222,938	\$495
Defender	0	0	0	0	0	119,897	99,094	218,991	\$295
Garden Edition	0	0	0	0	0	9,515	27,747	37,262	\$260
Total	75	582	4,660	31,672	106,530	245,784	263,338	652,641	

TABLE 1

As can be seen from Table 1, ABC has experienced tremendous unit sales growth from year to year. From 1998 to 1999, unit sales increased by 676%, from 1999 to 2000 by 700%, from 2000 to 2001 by 579%, from 2001 to 2002 by 236%, and from 2002 to 2003 by 131%. In all, unit sales grew over the five year period beginning in 1998 by a factor of over 3200.

Prior to ABC's introduction of its innovative insect traps into the market, I know of no flying insects traps that were sold commercially to the general public in the \$1,000.00 price range. At the time ABC began selling its innovative traps, flying insect traps and killing devices such as "bug zappers" and similar devices, were typically priced in the vicinity of approximately \$50.00 to \$80.00. As noted above, the prices of ABC's traps range between \$260 and \$1395, and for the first four years of sales, the price was between \$795 and \$1295. During those first four years, despite the fact that the ABC traps cost 10-25 times as much as other devices on the marketplace (i.e., those devices mentioned above in the \$50-80 price range), ABC experienced an average annual growth rate of 600% in its unit sales of its innovative insect traps. Further, in the years 2001 and 2002, when ABC began introducing lower priced versions of its innovative insect traps, ABC still experienced growth rates of 236% and 131%, respectively. Still, those lower priced counterflow insect traps are priced significantly higher than the other devices on the market in the \$50-\$80 price range.

Given the large disparity in price between ABC's insect traps and other devices on the market, it is evident from the rapid growth shown above in Table 1, that ABC's innovative traps work substantially better than any alternatives available in the marketplace. Along with the "bug zapper" type traps, the industry standard was the "CDC light trap," developed by the Centers for Disease Control in the 1960s. These types of traps also cost on the order of \$100 or less, much less than the ABC traps listed above and similar to the bug zapper traps. Customers have been willing to pay between five and 20 times the price of many of the other devices that were on the market (e.g., the \$50 to \$80 devices mentioned above). This success came about because the ABC traps work substantially better than other devices by capturing and eliminating large numbers of insects.

Because of the effectiveness of the ABC devices in catching blood-seeking flying insects, particularly mosquitoes, no-see-ums, black flies and sand flies, ABC, starting out as a newcomer to the commercial market as discussed above, has been able to sell 652,641 traps

through September 2004. Total retail sales of well over 250 million dollars have been made. The unit sales have increased steadily despite several years of continuous growth and the introduction of additional competing products. Thus, the commercial success of the ABC traps is clear.

In a previous Declaration dated July 24, 2003, and filed in the parent application, Ser. No. 09/682, 247 application ("the '247 application"), I attested to the commercial success of the insect traps sold by ABC. As I understand it, the Examiner of the '247 application stated in an Official Action that my July 24th Declaration was insufficient because there were no facts on advertising expenses and market share. Based on my experience in the insect trap marketplace as President of ABC, I do not believe that such information would be meaningfully relevant to the issue of the commercial success of the ABC traps. Specifically, as discussed herein and in my Declaration of July 24, 2003, prior to the introduction of ABC's innovative traps, commercially available traps were priced in the range of \$50-80 dollars. Even in view of the availability of those low-priced traps, the ABC traps experienced tremendous commercial success at significantly higher price points. In fact, during the first four years of sales of the ABC traps, they were priced 10-25 times higher than other devices available on the marketplace (i.e., those mentioned above in the \$50-80 price range). In view of these facts, I believe that evidence of market share and/or advertising expenses would not be particularly probative of the issue of commercial success. This is because comparing the higher priced ABC traps against the significantly lower priced prior devices in terms of market share is not a fair nor relevant comparison. Also, given the nature of the marketplace, and particularly the significantly higher price of ABC's innovative traps relative to other alternatives at the time of introduction, as a matter of common sense the commercial success could not be explained by advertising alone because no reasonable consumer is likely to pay many hundreds of dollars for an insect trap if a comparable one were available for less than one hundred dollars, no matter how effectively the higher priced trap is advertised.

Instead, the important fact that supports the commercial success of ABC's innovative traps is that consumers have been willing to purchase these higher-priced ABC traps even when faced with the choice of purchasing significantly lower-priced devices. Based on my experience in and understanding of the insect trap marketplace, this commercial success of the ABC insect traps is directly attributable to the use of the relationship between the inflow and outflow of these traps that enables the ABC traps to effectively attract and capture insects better than the lower-priced alternatives. This is the same relationship recited in the independent claims of the present application.

As additional evidence of commercial success, attached at Exhibit A is a copy of an article from the Fall 2003 edition of Inc. magazine, naming ABC as the fastest growing private company in the United States. This notable achievement is attributable to ABC's sales of its innovative insect traps, which are its primary products, and generated nearly all the revenue that drove ABC's rapid growth.

Also, various models of the Mosquito Magnet, a brand name for ABC's traps, have been favorably tested and reviewed in the Wall Street Journal (July 20, 2001), Consumer Reports (May, 2003), The Boston Globe (July 6, 2001), The Miami Herald (July 22, 2002), and The Washington Post (July 14, 2002; July 18, 2002). Copies of these articles are attached to this Declaration as Exhibits B-F, respectively, and further support the commercial success of ABC's innovative insect traps.

Further, in five independent studies, models of the Mosquito Magnet were found to be more effective than competitors' products. These studies were performed by the Cayman Islands Mosquito Research & Control Unit; Florida A&M University; Taylor Environmental and Biological Specialists; University of North Dakota; and U.S. Army Medical Command in conjunction with the Centers for Disease Control. Attached to this Declaration as Exhibit G is a sheet summarizing the five studies, evidencing the superiority of ABC's innovative insect traps to the competition.

Finally, the International Trade Commission has found ABC's products to be commercially successful. Specifically, in an Initial Determination, attached at Appendix H, the ITC addressed the issue of commercial success at page 67, n. 1 and pages 90-94. The products found by the ITC to be commercially successful are the same as those discussed herein.

The undersigned acknowledges that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon. All statement made based on the declarants's own knowledge and all statements made on information and belief are believed true.

A handwritten signature in black ink, appearing to read "Raymond Iannetta", is written over a horizontal line.

Raymond Iannetta, President
American Biophysics Corporation
Date: October 29, 2004

INC.
500

The No.1
Company

Growth of 25,615%!

IN THE LATE '90S, AMERICAN BIOPHYSICS ATTACHED THE TAG LINE "Fatal attraction for mosquitoes" to its flagship product. But when the company was just getting started, the four engineers who founded it had a very different objective—trying to keep the fragile mosquitoes alive. Back in 1991, the U.S. Army had issued bids for technology to survey the spread and impact of insect-borne diseases such as malaria, Lyme, and the then little-known West Nile virus. To see a virus in action, researchers needed carrier specimens alive and kicking. Thus American Biophysics rolled out the

SWAT TEAM: Ray Ianetta and Emma Durand have some 400,000 Mosquito Magnets in circulation—and the fastest-growing private company in America.

ABC Pro. Using standard mosquito bait, pure CO₂, it drew the biters to a container where an artificial breeze pinned them down safely. At the time, the only commercial application foreseen

for the ABC Pro was entomological surveillance—mostly by government, medical, or educational institutions. But scientists found the ABC Pro inefficient because they had to attend to it constantly, providing their own supply of dry ice (which “melts” into CO₂ vapor) or cylinders of the gas in compressed form to attract bugs. By 1997, the company was essentially bankrupt.

Searching for cash and guidance, its investors called on Ray lanetta, who had launched and sold three successful high-tech companies with longtime business partner Emma Durand. “When they approached me with the business plan,” remembers lanetta, now CEO of the company, “I said, ‘It’s bugs? I’m not biting.’ And I threw it in the basket.” But lanetta’s personal CPA, an early investor named Jeff Adam, made a plea for him and Durand to take another look.

An engineer and intellectual property expert, Durand saw a challenge: “Could we convert a niche surveillance tool to something that was commercially viable?” The potential to target problem insect populations without environmentally toxic pesticides and without harming benign species gave her hope. In July 1998, she and lanetta joined the company as chief of engineering and CEO, respectively. In 2001, they appointed Jeff Adam CFO.

THE EUREKA MOMENT CAME IN EARLY 1999. In Durand’s words: “We discovered a way to catalytically convert propane to yield CO₂ and enhance this attractant with additional chemicals expelled through a patented mechanism.” In laymen’s terms: They made a machine that could lure and kill biting insects 24-7 on autopilot. Together, lanetta and Durand invested a million dollars of capital and 24 months of labor.

Today, the Mosquito Magnet looks like the robotic love child of a propane grill and a vacuum cleaner. It works with patented “counterflow” technology, a two-fan system that generates both an updraft to carry the smell of dinner to the insects, and a down-draft to force them into a mesh net at the center of the machine. Unable to fight the breeze, the mosquitoes die of dehydration. American Biophysics says the Mosquito Magnet can snag up to 1,500 biters a night. It also boasts that in the summer of 2000, the U.S. Army Medical Command and the CDC found that the Mosquito Magnet captured three times more biting insects than any of seven other products using the same attractants.

Even so, it wasn’t easy for the company to get a foot in the door with retailers. That was accomplished, says Richard Valentine, a major shareholder in American Biophysics and CEO of F1 entertainment, by dint of Ray lanetta’s personality: “He’s the kind of guy where if you tell him ‘no’ he hears it as ‘know’—meaning you are telling him that you need to know more.”

In 1999, lanetta cold-called Rick Salek, a VP of merchandising for Frontgate, the high-end catalog retailer regularly featured in *Skymall*, to tell him the pest products he was selling didn’t work. “Maybe I was naive, not coming from the consumer market,” lanetta chuckles today, “but ours is based on real scientific principle—knowing what the female mosquito, the one that

bites, is attracted to, how it flies. This other thing they were selling was just another gadget.” After sampling, Frontgate agreed to carry the Pro. Even at \$1,295, it sold well.

To meet the nascent demand, American Biophysics began outsourcing manufacturing, finding more space for assembly and inventory in Rhode Island, increasing its marketing efforts, and hiring aggressively. Then lanetta set his sights on Home Depot. Once again, he got in the door with a cold call—although the growing reputation of his product helped. The VP of merchandising at Home Depot knew someone who loved the Pro, and the buyer in charge of the garden category had seen it in pest-control trade publications.

“When they approached me with the business plan, I said, ‘It’s bugs? I’m not biting.’ And I threw it in the basket.”

Ray lanetta, American Biophysics CEO

lanetta packed his samples and boarded a plane for a product review in Nevada—only to miss his connection. Stranded in Chicago with no other flight to board, due to meet “the Depot” at 5 in Reno, he chartered a private Cessna, racking up \$16,000 on his personal credit card. On arrival, he realized crucial pieces of the samples were missing, stuck in the belly of a commercial airplane. But Home Depot was already convinced the product worked. What it didn’t know was, could a small company like American Biophysics offer something in the right price range? lanetta promised the Liberty model with a \$495 price tag. The chain’s buyers also asked if American Biophysics would refrain from selling to its competitors in the U.S.; lanetta quickly agreed.

For its part, Home Depot designated American Biophysics as its sole supplier of mosquito-attractive traps in 2002 and 2003. The chain also provides promotional support. “This new technology isn’t like a \$4 bug spray, but more like a lawnmower,” says John Fuller, global product merchant for Home Depot. “You have to know how to use it right, how to position it so that you don’t get between the mosquitoes and the trap and end up as their food source. We’re committed to solving our customers’ bug-bite problems, so we do a lot of in-store demonstrations, and often highlight the Mosquito Magnet in the sidebars of our catalog.”

By the end of the 2001 fiscal year, American Biophysics had achieved profitability with revenue surpassing \$23 million. The following year, revenue more than doubled. Today, the company sells three models: The Defender (\$295, half-acre coverage) and the Liberty (\$495, one-acre coverage) both come with 50-foot extension cords and require electrical power; the Pro (\$1,295, one-acre coverage) contains a mechanical power pack (not a chemical battery) and is freestanding. Each model requires the occasional replacement net and refills of propane and attractants, costing about \$15 monthly for the average U.S. consumer (while creating repeat sales opportunities for accessory retailers).

CFO Jeff Adam reports there are some 400,000 Mosquito Magnets in circulation. This past summer, 30-second commercials aired during CNN *Headline News*, *Trading Spaces*, and on the Weather Channel. The devices popped up at high-profile venues, from Jones Beach to Pebble Beach. And through relationships with at least 50 dealers, American Biophysics now sells Magnets on every continent but Antarctica, where temperatures are too low for mosquitoes to survive.

LORA KOLODNY

Splat! The New Bug Busters

As Mosquito Scares Spread,
Bug-Killing Goes High-Tech;
An \$800 Platinum Fly Trap?

By JUNE FLETCHER

Staff Reporter of THE WALL STREET JOURNAL

AS SOON AS VISITORS arrive at Alex Randall's Caribbean hideaway, he hands them small yellow racquets. But they aren't for tennis. They're battery-operated bug zappers with electrified "strings," used to whack the clouds of mosquitoes that infest his 1-acre home near St. Thomas. "If you accidentally hit yourself—ouch," says Mr. Randall, a radio announcer.

Forget the citronella candles and the flyswatter—this summer the war against mosquitoes has gone high-tech. From bug vacuums that look like laser swords to wristwatches that mimic the sound of a dragonfly's wings, gadget makers have been rolling out the heavy artillery. Perhaps the hottest thing on the market: an \$800 propane-powered gizmo called the Mosquito Magnet that supposedly emits the smell of animal breath to attract bugs. While spending on repellents is up a moderate 5.4% this year to \$112.4 million, gadget makers are reporting big increases: Lentek, maker of the bug vac, for instance, says sales have quadrupled over the same period last year.

Of course, the battle of the bugs isn't a new one. But it's gotten so high-tech—and so expensive—for a simple reason: fear. The outbreak of the mosquito-borne West Nile virus two years ago spurred emergency spraying campaigns in the New York area. In Houston this year, in the wake of Tropical Storm Allison, as many as 100 of the bloodsuckers were landing on people per minute—raising the specter of encephalitis and other viral epidemics. Add in the wet spring in many parts of the country, which had mosquito



levels at record numbers—one St. Louis park known locally as Vampire Hollow had bug counts in late June four times their usual level—and you've got the makings of a real scare.

Almost universally, mosquito experts say this is a classic case of overreaction. "People are panicking, looking for new things," says Dan Kline, a U.S. government entomologist who gets 50

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e-mails a day—up from that many a week—from mosquito-plagued homeowners. Most of the high-tech artillery is unnecessary, says Ulrich Bernier, a federal entomologist in Gainesville, Fla. In the U.S., he says, "mosquitoes are more of a nuisance than a real threat of disease."

Try telling that to Tim and Bilynda Muldoon, whose mosquito-infested Harvard, Mass., yard was so bad "we couldn't even go outside," Mrs. Muldoon says. They tried everything—citronella candles and bracelets, even one of the devices that mimics the sound of dragonfly wings—before finally shelling out \$1,300 for a "professional" model Mosquito Magnet. By the third week, when they checked the trap, they found hundreds of tiny winged corpses. And, after investing in a second magnet, they were able to go outside again. "We still get a bite or two," Mrs. Muldoon says. "But at least I'm not the only mosquito magnet around."

As far as most people are concerned, bug technology reached its high point with those black-light bug zappers whose zzz...pop! has punctuated many a backyard cocktail party. But in the past few years, the bug-fighting industry has gone into overdrive. Some of its biggest sellers are refashioned older products: The chemical that's used in smoky mosquito coils has been repackaged as the OFF! Mosquito Lamp (S1). Lentek's \$15 "Tomb or Schwabell's ThermoCELL Mosquito Repellent (S25). Then there's S.C. Johnson & Son's OFF!, which now comes in a goopy, soapy-scented purple "Magicolor" version. Even those bug zap-

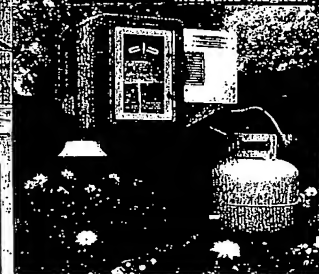
The Tomb



Bug Vacuum



Mosquito Control



Mosquito Magnet

One woman swears by
her new mosquito
wristband. 'As silly as it
looks, I wish I could
wear it around my neck.'

pers have been updated—these days, rather than frying mosquitoes, which explodes germs into the air, they drown them in water.

Dustbusters for Bugs

Also on the market: mosquito bracelets (some contain repellents, others use sound), mosquito vacuums (like Dustbusters for bugs) and Alex Randall's racquets. At the top of the tech heap, is the Mosquito Magnet, which works by converting propane into a plume of carbon dioxide, heat and humidity that draws bugs, which then get sucked into a net inside the machine. Ray Lentine, president of American Biophysics Corp., the East Greenwich, R.I., maker of the Magnet, says one reason his unit is so expensive is it uses 11 ounces of platinum to drive the chemical reaction.

Mary Haley, a Vienna, Va., homemaker, is sold on the new technology. Every time she goes out, she wears a \$6 lime-green plastic wristband from BugOff; whose active ingredients are that old standby citronella, plus geraniol (a newly discovered compound that seems to make wearers invisible to mosquitoes) and lemon eucalyptus. That keeps her arms bite-free, but not her face. "As silly as it looks, I wish I could wear it around my neck," she says.

And after various commercial repellents—as well as home remedies such as garlic and vine-

The Swat Team

Gadget makers have rolled out a new generation of bug-fighting products this summer. But do they work? To find out, we tested them in our own backyard, tallying the number of bugs caught. The results:

PRODUCT/PRICE	BUG COUNT	COMMENT
Alessi Flyswatter \$9.99 www.grassell.com	30 mosquitoes in an hour.	A contender, though your arm might give out. Not high-tech, but high-fashion, this is designed by Philippe Starck. It works like the plain old-fashioned ones.
Bug Eater \$65 www.whatevenworks.com	8 mosquitoes in 24 hours.	Lowest bug count. Rather than frying bugs like old zappers, which explodes germs into the air, this drowns them. Maker says it should be used in a contained space.
Bug Vacuum \$50 www.lentek.com	13 mosquitoes and two spiders in 3 hours	Good, but requires you to be on the lookout for pests. Like a Dustbuster for bugs. To use, place the tip over the bug, push a button, and swoosh!
Mosquito Magnet \$800/\$1,300 www.frontgate.com	32 mosquitoes and hundreds of smaller bugs in 24 hours	The winner, but the per-bug price is hefty. Attracts bugs, then traps them. We tested the more expensive "pro" model. Maker says it takes eight weeks to clear a yard.
Racquet Zapper \$6 www.pestdetour.com	7 mosquitoes and a fly in 10 minutes (then our arm got tired)	Good value on a per-bug basis. Strings carry a low-volt charge, powered by a battery in the handle. One plus: You can work on your backhand as you swat.

gar—failed to ward off the bugs in Terry Lee's back deck, she started relying on a flyswatter powered by her husband. But then he got sick of being the family bug-killer. "My husband said if I asked him to swat one more bug, he'd swat me," says Mrs. Lee, a retired nurse in Los Angeles. She swears by a \$50 Bug Vacuum whenever she sits out—"It's my magic wand," Mrs. Lee says.

But is any of this really worth it? Mr. Bernier, the Florida entomologist, says the effectiveness of any product may depend on where you live—different mosquitoes may be more or less susceptible to different repellents and attractants. What they aren't susceptible to, says Harold Harlan, senior entomologist at the National Pest Management Association, an industry group that enlists electrical

prudes, magnetic fields or sound, because all mosquitoes really care about is scent.

Lou Lentine, president of Lentek, maker of many such gadgets, says that the company does its own testing and that the products work. However, one outside group found in its tests that some electronic products reduced the bugs by only 35%, a "not significant" effect. "Wouldn't you call a 35% reduction in your salary significant?" Mr. Lentine counters.

Flying From Miles Away

Meanwhile, the pricey Mosquito Magnet gets high marks from bug experts, but even it has a downside: It may be too effective, attracting mosquitoes from miles away. "If they get to you first, you're dinner," Mr. Harlan says. Mr.

Bugs 'Away

These products, many of them twists on old standbys, promise to keep the bugs away. We tested them in our backyard, then counted bites. The results:

PRODUCT/PRICE	BITE COUNT	COMMENT
BugOff Wristband, Two for \$6 www.pestdetour.com	1 bite in 2 hours	Fairly effective: This collar-wristband is impregnated with oil of citronella, lemongrass and geraniol.
Magicolor OFF!, \$9.95 Most drugstores	0 bites in 3 hours	The for first: The DEET-free, talc-free formula is not new, but the purple color is. It's aimed at kids and teens.
Mosquito Control \$10 www.gomollie.com	2 bites in 3 hours	Most bites: This mimics a dragonfly. Some experts say it's a humbug. Maker says it's 85% effective.
Mosquito Hat \$5.50; \$9 large www.mosquitohat.com	0 bites in 3 hours	Tie for first: It's definitely low-tech, but it's the one barrier even the hungriest bugs can't break through.
The Tomb \$15 www.lentek.com	1 bite in 3 hours	Fairly effective: Looks like a plug-in fragrance dispenser, burns the same pesticide as mosquitoes.

Kline, the government mosquito expert, has come up with his own low-tech version of the magnet: dirty socks (the smell is apparently nectar to mosquitoes) hung over a tank of carbon dioxide. "The neighbors looked at me strangely," Mr. Kline says. "But the mosquitoes really loved that good foot odor."

Some people find even that a little too much. Leonard Ladin, a retired chemist, eschews chemicals as "too dangerous," and calls the various bug zappers he's tried "hopeless." Mr. Ladin's solution? A hat covered with mosquito netting that ties under his chin, which he wears with long-sleeved shirts, pants and gardening gloves while putting around the 28 flower beds on his Copake, N.Y., estate. "People laugh, but I never get bitten anymore," he says.

FEATURE REPORT

May 2003

NATION

Should you trap or zap?

• Ratings

A repellent may work on the person wearing it, but what if you want to ban mosquitoes from a whole area, so, say, they won't crash your backyard barbecue? Bug zappers, the ultraviolet-light devices that slay insects with a reassuring "zot!" are one option. In our tests, however, a zapper killed barely more mosquitoes than lodged on a nearby piece of sticky paper.

A newer choice: traps that lure and capture mosquitoes by mimicking mammals. The three widely sold traps we tested were not a cure-all. Although they were far more effective than the zapper at removing mosquitoes we released into a lab room, they didn't eliminate all of them. A species that carries West Nile virus was only moderately attracted.

In the end, we had to agree with Ray Parsons, director of mosquito control for Harris County, Texas, site of a large West Nile virus outbreak. "They do pull in lots of mosquitoes," Parsons told us, "but people shouldn't expect them to reduce the potential of disease transmission completely."

How they work. Traps mimic factors that make people irresistible to mosquitoes: exhalations, odors, body heat, or sound. Once they've lured the bugs—from a claimed area of 3/4 acre or 1 acre, depending on the model—they use either suction or sticky paper to capture them. The traps we tested must be plugged into an electrical outlet, and manufacturers advise using them around the clock during mosquito season, rain or shine.

The *American Biophysics Mosquito Magnet Liberty*, \$500, and the *Lentek Mosquito Trap MK01*, \$325, generate carbon dioxide and warmth by burning propane from a standard 20-pound tank that must be purchased separately. The *Magnet Liberty* also includes a cartridge of octenol, a chemical attractant said to smell—to a hungry mosquito, at least—like cow's breath. Both traps have fans that suck approaching mosquitoes into a mesh bag or cup, where they stay because they can't fly "upwind." (They then dehydrate and die.) The *Magnet Liberty's* fine-mesh bag should also capture no-see-ums and other tiny biting insects; the larger holes in the *Trap MK01's* cup or bag (both are included) may let some slip through. The *Applica SonicWeb ICH500*, \$300, has a small loudspeaker that generates the sound of a heartbeat. A plastic frame surrounding the speaker includes an electric heating element, a hook for hanging an octenol lure, and a cylinder that holds a sticky paper sleeve that captures mosquitoes only if they land on it.

How we tested. We released a couple thousand mosquitoes into a 25-by-30-foot sealed room with a trap at one end. About half were *Culex quinquefasciatus*, a species that has helped spread West Nile virus into the southern U.S. (*Culex pipiens*, a close relative with almost identical habits, is mainly to blame for the outbreak in the North.) The rest were *Aedes aegypti*, a common southern species that's especially tenacious in its pursuit of people.

We ran each trap for 20 hours, half of that time in the dark, then recorded the number and species of mosquitoes caught in each device.

How they performed. Within minutes of entering the test chamber, swarms of mosquitoes

clustered around the *Magnet Liberty* and *Mosquito Trap MK01*. Some mosquitoes swarmed near the *SonicWeb*, but many perched on its frame instead of landing on the sticky sleeve.

By the end of its 20 hours, the *Magnet Liberty* had caught about three-fourths of the mosquitoes; so had the *Trap MK01*. The *SonicWeb* had trapped only about one-fourth. The bug zapper killed far fewer, even though it provided the only light in the room during our simulated night. All three traps caught about twice as many *Aedes* mosquitoes as *Culex*. That's probably because *Aedes* are highly aggressive and like to bite the mammals that the machines impersonate. *Culex* are less aggressive and prefer birds.

In general, the more traps in a neighborhood and the more strategic their placement (between a swamp and a backyard, say), the more effective the control.

How easy they are to use. To avoid luring mosquitoes to people, you're supposed to put traps far from areas where people gather. You may need several long extension cords, which can be inconvenient. The *Magnet Liberty* and *Trap MK01* must be placed so the prevailing breeze carries the gas plume across the yard. Because of their use of electricity, propane, or chemicals, all the traps must be used only outdoors and should be placed where children are unlikely to touch them.

The *Magnet Liberty* and *Trap MK01* look like robot brothers, but the shorter *Magnet Liberty* is easier to use. It nestles inside a compact, stable metal frame that can be wheeled with little effort. It has electronic controls and ignition, and its fan is barely audible from a few feet away. The *Trap MK01* is top-heavy and has no wheels, so it's hard to move. You ignite it with a match or lighter, and its fan is as loud as an air conditioner, though that shouldn't be distracting when the device is placed as recommended.

The *SonicWeb* is a cinch to set up: Hang the octenol lure, pop on the sticky paper sleeve, and plug it in. Its thumping "heartbeat" is quieter than the *Trap MK01*'s fan. But again, in our tests, the *SonicWeb* was much less effective than the others.

Recommendations. Our tests were conducted in a lab, not outdoors. Still, they indicate that if traps are continuously operated under the right circumstances, they can reduce the number of mosquitoes in your yard. Our top choice, the *Mosquito Magnet Liberty*, \$500, performed well and was easy to use.

Traps are expensive. After paying hundreds of dollars for the device itself, you'll pay \$20 to \$25 a month for electricity and components such as propane, octenol lures, and sticky paper. And traps are unlikely to prevent all bites. Therefore, consider low-tech approaches first: Apply repellent, wear protective clothing, and eliminate mosquito-breeding habitats in and near your yard.

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permission

The *American Biophysics Mosquito Magnet Liberty*, \$500, and the *Lentek Mosquito Trap MK01*, \$325, generate carbon dioxide and warmth by burning propane from a standard 20-pound tank that must be purchased separately. The *Magnet Liberty* also includes a cartridge of octenol, a chemical attractant said to smell—to a hungry mosquito, at least—like cow's breath. Both traps have fans that suck approaching mosquitoes into a mesh bag or cup, where they stay because they can't fly "upwind." (They then dehydrate and die.) The *Magnet Liberty*'s fine-mesh bag should also capture no-see-ums and other tiny biting insects; the larger holes in the *Trap MK01*'s cup or bag (both are included) may let some slip through. The *Applica SonicWeb ICH500*, \$300, has a small loudspeaker that generates the sound of a heartbeat. A plastic frame surrounding the speaker includes an electric heating element, a hook for hanging an octenol lure, and a cylinder that holds a sticky paper sleeve that captures mosquitoes only if they land on it.

Comment: The LenTek is a clear patent infringer.

Comment: We catch no-see-um's, the competitors don't.

How we tested. We released a couple thousand mosquitoes into a 25-by-30-foot sealed room with a trap at one end. About half were *Culex quinquefasciatus*, a species that has helped spread West Nile virus into the southern U.S. (*Culex pipiens*, a close relative with almost identical habits, is mainly to blame for the outbreak in the North.) The rest were *Aedes aegypti*, a common southern species that's especially tenacious in its pursuit of people.

Comment: See email from Dr. Alan Wheeler Cayman Islands Biological Research & Mosquito Control. He states our traps cleared the island of *Aedes aegypti*.

By the end of its 20 hours, the *Magnet Liberty* had caught about three-fourths of the mosquitoes; so had the *Trap MK01*. The *SonicWeb* had trapped only about one-fourth. The bug zapper killed far fewer, even though it provided the only light in the room during our simulated night. All three traps caught about twice as many *Aedes* mosquitoes as *Culex*. That's probably because *Aedes* are highly aggressive and like to bite the mammals that the machines impersonate. *Culex* are less aggressive and prefer birds.

The *Magnet Liberty* and *Trap MK01* look like robot brothers, but the shorter *Magnet Liberty* is easier to use. It nestles inside a compact, stable metal frame that can be wheeled with little effort. It has electronic controls and ignition, and its fan is barely audible from a few feet away. The *Trap MK01* is top-heavy and has no wheels, so it's hard to move. You ignite it with a match or lighter, and its fan is as loud as an air conditioner, though that shouldn't be distracting when the device is placed as recommended.

Comment: Easier to use.

The *SonicWeb* is a cinch to set up: Hang the octenol lure, pop on the sticky paper sleeve, and plug it in. Its thumping "heartbeat" is quieter than the *Trap MK01*'s fan. But again, in our tests, the *SonicWeb* was much less effective than the others.

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Comment: Mosquito Magnet is quiet and easy to move. Competitor (LenTek) is top heavy, loud, and hard to move.

Recommendations. Our tests were conducted in a lab, not outdoors. Still, they indicate that if traps are continuously operated under the right circumstances, they can reduce the number of mosquitoes in your yard. Our top choice, the *Mosquito Magnet Liberty*, \$500, performed well and was easy to use.

Comment: This is a stunning recommendation according to an 18 year GE/Black & Decker veteran.

The Boston Globe Business

THE BOSTON GLOBE FRIDAY, JULY 6, 2001

This business needs buzz to survive

Its backers say
the Magnet really
kills mosquitoes

By Chris Reidy
GLOBE STAFF

EAST GREENWICH, R.I. — Forget bug zappers and pesticides this summer. And don't be fooled by machines that claim to kill mosquitoes with sound waves.

At American Biophysics Corp., chief executive Raymond Iannetta touts his company's \$795 Mosquito Magnet. It's everything you could want for making al fresco dining bug-free, he said.

Not only does the Mosquito Magnet create a half-acre DMZ around backyard cookouts and barbecues, its makers claim; it also kills mosquitoes in an environmentally correct manner. Translation: No pesticides are used. Victims die, often a thousand at a time, from dehydration.

After about two years on the market, the Mosquito Magnet hasn't persuaded all the skeptics, but it has won many fans.

One true believer is Tim Muldoon, a software architect for Fidelity Investments. A few years ago, he and his wife, Bilynda, bought a house in Harvard near some wetlands.

When they moved in at winter's end, the house seemed ideal, but in the summer, swarms of mosquitoes chased them from their backyard. So the couple installed two Mosquito Magnets, the deluxe models that today sell for \$1,295 apiece.

Said Tim Muldoon, "Now I can walk around my rose bushes buck naked at dusk."

One challenge for American Biophysics is that no independent research group has evaluated its product, so its sales pitch relies on strictly anecdotal evidence.

Iannetta has plenty of anecdotes. For example, New York City's Department of Environmental Protection has bought more than 100 units for use at sewage-treatment facilities, a fact confirmed by a department spokesman.

Another anecdote: In bug-infested Florida, where the exterminator is revered, there have been recent reports of stolen Mosquito Magnets, Iannetta noted gleefully.

Anecdotal evidence doesn't mean much to a scientist, though. Scientists want objective analysis, especially since so many bug-killing devices have turned out to be pure hype.

"Most of them don't work at all; they're hocus-pocus," said Andrew Spielman, professor of tropical public health at the Harvard School of Public Health.

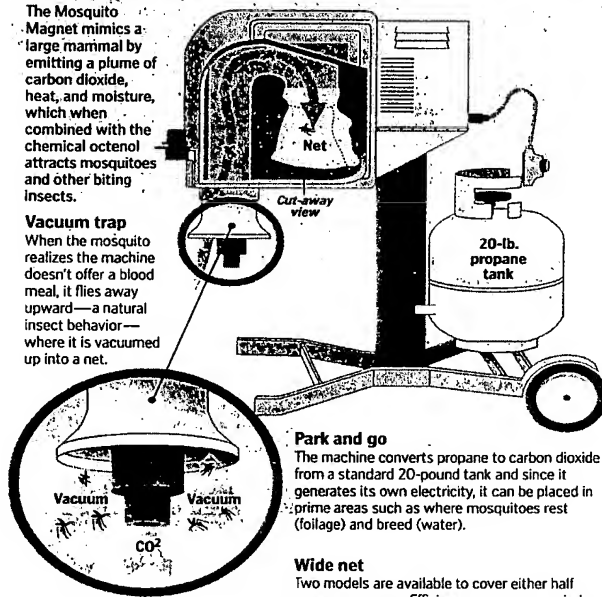
Said Iannetta, "That's our biggest problem, overcoming the gimmick-and-gadget syndrome."

The Mosquito Magnet wasn't

Outdoors bite-free

The Mosquito Magnet mimics a large mammal by emitting a plume of carbon dioxide, heat, and moisture, which when combined with the chemical octenol attracts mosquitoes and other biting insects.

Vacuum trap
When the mosquito realizes the machine doesn't offer a blood meal, it flies away upward—a natural insect behavior—where it is vacuumed up into a net.



Park and go

The machine converts propane to carbon dioxide from a standard 20-pound tank and since it generates its own electricity, it can be placed in prime areas such as where mosquitoes rest (follage) and breed (water).

Wide net

Two models are available to cover either half an acre or an acre. Efficiency may vary on wind conditions and levels of infestation.

SOURCE: Mosquito Magnet

GLOBE STAFF GRAPHIC/ALEJANDRO GONZALEZ



GLOBE STAFF PHOTO / JONATHAN WIGGS

'No one believed us. All they said was, "Yeah, yeah, bug traps. . . ."

RAYMOND IANNETTA, CEO of American Biophysics

American Biophysics' original business. When the company was launched a decade ago, its focus was on making mosquito traps that customers such as the US Department of Agriculture use to determine the

presence of diseases and viruses carried by biting insects.

Under research director Bruce E. Wigton, the company studied the mosquito's nervous system and how carbon dioxide excites female mosquitoes when they are searching for a blood meal. (Male mosquitoes don't bite humans.)

To a female mosquito, carbon dioxide means a large mammal is nearby. Expose a mosquito to carbon dioxide, and she'll react a bit like a shark smelling blood in the water.

Company scientists also researched mosquito flying habits and navigational skills. Dipping mosquitoes into phosphorescent dyes before releasing them, scientists with night-vision goggles learned that mosquitoes invariably gain altitude when they turn.

Such information proved useful when American Biophysics set out to design the Mosquito Magnet about five years ago.

In its current form, the device looks a bit like a cooking grill. It comes on wheels, and it uses a 20-pound propane tank to fuel a chemical reaction that emits a plume of carbon dioxide that hovers 18 inches off the ground; 20 pounds of propane, which costs about \$12, will keep a Mosquito Magnet in continuous operation for about three weeks, Iannetta said.

Fans abuzz about Mosquito Magnet

► MOSQUITOES
Continued from Page E1

Traditional mosquito traps, by contrast, use dry ice to create the carbon dioxide that acts as bait. The ice has to be replaced frequently, making them impractical for consumers.

According to American Biophysics, mosquitoes rarely travel far from their home base. And because they can double their weight after gorging on blood, mosquitoes fly into the wind when they seek food; that way, bloated bugs can glide home with the help of a tail wind, Iannetta said.

The Mosquito Magnet takes such behavior into account.

When mosquitoes realize there's no mammal at the end of the carbon-dioxide plume that serves as bait, they veer upward to begin a new hunting pattern. That change of course takes them within range of the Mosquito Magnet's propane-powered vacuum.

Mosquitoes are then sucked inside the machine and trapped in a net where they die from dehydration in about 24 hours.

With no extension cords to limit its range, the portable and self-powered Mosquito Magnet can be strategically placed in the aerial traffic patterns that mosquitoes fly at dawn and dusk.

While initial casualty rates are often high, it takes four to six weeks of continuous operation to virtually eliminate a local mosquito population from a backyard,

Iannetta said. His product kills many blood-feeding insects besides mosquitoes, he said, including black flies and biting midges, which are also known as no-see-ums.

No-see-ums abound in Florida, where the company did much of its product testing. At one wealthy retirement community, residents were so impressed that they not only bought Mosquito Magnets by the score but invested a chunk of the \$11 million that American Biophysics needed to finance development.

"Our customers became our investors," Iannetta said.

Lining up retailers and a sales force to sell the Mosquito Magnet was a far more difficult task.

"No one believed us," Iannetta said. "All they said was, 'Yeah, yeah, bug traps. . . .'"

At first, sales came in ones and twos. A consumer would buy one and then a neighbor would buy one, too. Helped by word of mouth, privately owned American Biophysics had sales of \$6 million in 2000, it said. It projects \$25 million in sales this year and \$50 million in 2002, Iannetta said.

Over time, the product has gained converts. An upscale catalog called Frontgate now sells the Mosquito Magnet, and many hardware stores are beginning to stock the item.

American Biophysics, which employs about 100 workers, sees big future opportunities in such

tropical countries as Indonesia and Brazil. Military bases, theme parks, zoos, outdoor restaurants — all are potential customers, Iannetta said.

As director of the mosquito-testing lab for the Massachusetts Department of Public Health, Ralph Timperi knows all about the hardness of mosquitoes — but wonders how many Bay State consumers actually need an expensive mosquito-killing device.

During their brief lives, mosquitoes reproduce exponentially, especially during rainy summers like this one. As fast as one population is killed off, a new one materializes, so keeping mosquitoes in check is a constant battle, he said.

His advice to consumers? Use common sense and cheap repellent.

Muldoon, the Harvard homeowner, tried cheap repellent and just about everything else to reclaim his yard.

"Bug lights, zappers — they didn't do much," he said.

He jokingly credits Mosquito Magnets with having saved his marriage.

"My wife was ready to abandon ship," Muldoon said. "If we didn't have them, I'd either be divorced or moving back to Arlington."

Chris Reidy can be reached by e-mail at reidy@globe.com.

FATAL ATTRACTION



AL DIAZ/HERALD STAFF

BUG OFF! At the Mosquito Magnet Depot in Key Largo, Deborah Corrao, director of sales, deals with the pesky insect daily.

Latest in the
mosquito wars?
A machine that
mesmerizes the
skeeters with
scent, then
sucks them up
like a vacuum.

BY GEORGIA TASKER
gtasker@herald.com

The buzzing isn't just in your head, it's the white noise of South Florida's mosquito season.

It may be the one time of the year when you pray to be doused by chemicals dropped from planes. You can't go near the patio unless there's a southeasterly wind blowing. And working in the garden means welt city (scratching bites on your knuckles is the worst).

Now, there's a not-so-secret device being used by the U.S. Coast Guard, the rangers at Everglades National Park and folks who run restaurants, resorts and an array of establishments in the Great Outdoors.

It's called the Mosquito Magnet, and it's selling like local brew in a Key West pub.

The Mosquito Magnet attracts 'em and zaps 'em. It lures them and dehydrates them.

It costs between \$495 and \$1,295, but no one seems to mind. After all, government efforts to control the pests cost Florida about \$88 million each year, and jump to \$400 million nationwide.

Miamian Fred Herman, who works in his open-air boat shop, has a Mosquito Magnet running just outside. And while

► PLEASE SEE MAGNET, 2C

These repellents work best

Hikers know that Deep Woods OFF is the mosquito spray of choice.

So does the New England Journal of Medicine, which last year published a study about the most effective repellents. DEET, which was developed for the U.S. Army, is the chemical in Deep Woods that kills skeeters.

A number of products use DEET, including Cutter's Skinsations with 6.65 percent DEET, and Sawyer Controlled Release with 20 percent DEET. Deep Woods contains 25 percent DEET.

Least effective? Lemon-scented geraniums, which for years have been touted as mosquito repellents, and wristbands that contain either citronella or DEET. (Repellent works best when applied directly to the skin or clothing.)

Citronella candles can keep mosquitoes at bay — but so can regular candles. Or the barbecue grill. Skin-So-Soft from Avon will do the trick for about 20 minutes, and citronella oils also are effective only briefly.

— GEORGIA TASKER

Mosquito Magnet: Device lures, kills

► MAGNET, FROM 1C

it's near his horses — also prone to mosquito bites — he purchased the machine to protect himself.

"I bought the machine for me," he says.

Naples restaurant owner Vin DiPasquale, who has waterfront eateries at Tin City and Crayton Cove, has posted mosquito machines outside both of his operations. He bought them last year.

"We're catching lots of mosquitoes," DiPasquale said. "If you locate them strategically, they work fine."

Deborah Nordeen, assistant public affairs officer at Everglades National Park, says the park began using the Mosquito Magnets last summer, and several are scattered through the park.

"We have one at the main park entrance, and it works pretty well there," Nordeen said. "And we have about 16 in the Flamingo area. Surrounded by mosquitoes' breeding habitat, they take out a lot of mosquitoes, but the void is pretty quickly filled."

The Flamingo machines have their large mesh bags emptied every day. Rangers have calculated each bag contains about 225,000 mosquitoes, Nordeen said.

The Magnet is made by American Biophysics, a Rhode Island company. The company's only product, it was introduced in 1999.

Ray Iannetta, president and CEO, says mosquitoes are attracted to carbon dioxide, which is what animals (humans included) exhale. When you add a substance called octenol — which Iannetta describes as a byproduct of the digestive system of grazing animals — the attraction is even greater for mosquitoes.

So the Mosquito Magnet blows out a stream of carbon dioxide, catalytically converted from platinum and propane, and sucks in mosquitoes when they get within six inches of the vacuum. In the largest machine, called the Pro, the vacuum is powered by propane. Smaller models, which Iannetta says could protect a 10-by-10-foot patio, use electricity.

By running the machine around the clock, Iannetta says, the user can catch daytime biters such as saltmarsh mosquitoes, no-see-ums and Asian tiger mosquitoes, as well as the vast majority of mosquitoes, which are active at dawn, dusk and night.

The company's scientists are working to map mosquitoes throughout the United States and come up with traps for specific species. Florida alone has about 75 kinds of mosquitoes.

The scientists also are isolating different compounds given off by human skin (they've detected 330 so far) to make a range of mosquito-attracting substances.

Donovan Smith, whose 35 wooded acres in East Naples is near Alligator Alley, has five machines going to keep skeeters away from his exotic animals. He hires out chimps, lions, leopards — even giraffes — for parties and educational tours.

The Mosquito Magnets "are not a cure-all, but they substantially eliminate a major number of mosquitoes," Smith said. "When they first hatch,

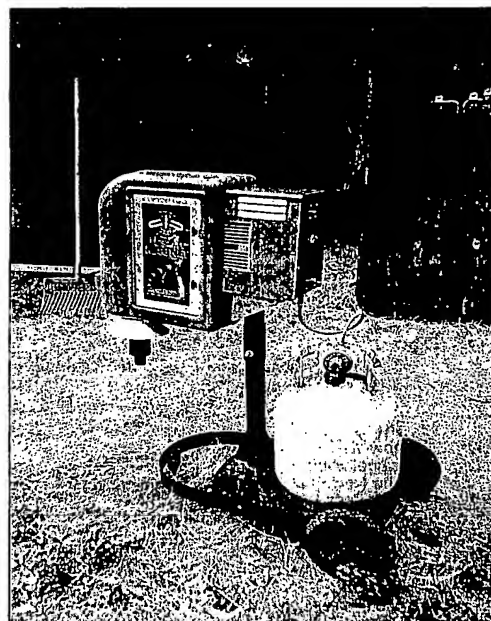
Not a biting chance

A stream of carbon dioxide draws mosquitoes to the Mosquito Magnet. When the insects get within inches of the vacuum, it sucks them in.



MDL072202

MARCO A. RUIZ / HERALD STAFF



TIM CHAPMAN/HERALD STAFF

MAN AND BEAST: Though it's near his horses, Fred Herman bought his Mosquito Magnet to protect himself in his open-air boat shop.

you'll be bitten by some, and it takes the magnets a couple of days to catch up."

Smith has a female leopard that's allergic to mosquito bites, and until he set up a Mosquito Magnet near her enclosure last year, he had to give the cat about 10 cortisone shots a year. Now, he gives her one.

"I've spent a fortune in the past [on mosquito repellents]. Everybody's bought a bug light that didn't work. But even the smallest [Mosquito Magnet] is still better than anything out there."

Key Largo, 2,500 units have been sold since January at the Mosquito Magnet Depot, just past Mile Marker 103 on the bay side. Frank DiRico, a customer so enamored with the product he became an investor, opened the store in October 2000.

DiRico calls the machines "revolutionary" and tells of running into his Key Largo house from his car and his boat in mosquito season before he got the machines. He now has three magnets around his house.

Ordinary things can be nurseries for hatchlings

BY GEORGIA TASKER

gtasker@herald.com

Bromeliads can collect whole ecosystems of critters in their rain-filled cups, and gardeners know mosquitoes are a part of that soup.

If you flush the plants with a hose every few days, the larvae will die. Or, you can pour a horticultural oil into the bromeliad cup, creating a film that prevents mosquitoes from hatching.

Mosquito Dunks, available at most hardware and garden stores, contains a bacteria (*Bacillus thuringiensis israelensis*) that kills mosquito larvae. Break up a tablet and place little pieces in the bromeliad cup.

Bromeliads aren't the only place where mosquitoes breed. Birdbaths, flower pots, buckets, uncovered garbage cans and other water-holding containers should be emptied of standing water, as they're potential nurseries for mosquitoes. Don't forget the saucers that go under plant containers. Turn them over when you store them.

If outside between dusk and dawn, wear long-sleeved shirts, long pants and shoes with socks. And use a mosquito repellent.

The biggest benefit, he says, may be in developing countries where malaria, dengue fever and other mosquito-borne diseases are on the rise.

Herman, who works in the boat shop, says that when mosquitoes are at their peak at this time of year, his single magnet works — to a degree.

"It does get mosquitoes in a restricted area," he said. "Due to the fact that we have a lot of foliage, it only gets an area within 50 feet around the unit itself. Right now, I'd have to have about 50 to get the full benefit."

Why Mosquitoes?

SKEETERS, From F1

Skeeter Cheater: Summer's Cool Tool

Can Lure Them In
And Suck Them Up:
Is It Safe to Go
Back in Back Yard?

By ANN GERHART
Washington Post Staff Writer

A perfect summer evening, the chilled sautignon blanc, perhaps gentle waves lapping against a wooden hull, and then... here comes the insistent thin whine of the advancing invader. She deftly inserts her proboscis into your skin. An annoyance, a burn, a sting. *Smack!* Even in the dusk, you can see the scarlet residue. Your blood? Or the prior victim's?

The rest of the world has mosquito netting. Here in America we take comfort in technology.

And so, this bulletin from the Office of Backyard Security: There is a promising smart bomb for mosquito control, manufactured by the impressively named **American Biophysics Corp.** It costs up to \$1,295, and of course you can order it online. Every summer, there is a product essential in commercial or industrial applications that the wealthy class adopts for leisure use. Last year it was the \$2,500 stainless-steel gas grill. This year it is the Mosquito Magnet.

In a nation gripped by terror, it promises to keep the house in order. In the past few years, despite their hefty price tag, more than 150,000 of the mosquito-killing machines have been sold from Alaska to Florida, Africa to the Caribbean. This summer, sales are up 400 percent for the machine, according to Ray Iannetta, the president and CEO of American Biophysics, which makes only this one product.

Mary Dufour bought the \$495 model for her "teeny-tiny" gem of a garden in Arlington, with its lovely goldfish pond, where she would sit and slap and reflect on mosquitoes. "I try to think about what is their purpose, like, 'C'mon, God, why?'" She set up her

green machine at the beginning of June and this week conducted her own experiment. Across the street, skeeters attacked her in her neighbor's yard "probably 10 times in a minute." Back home, where the machine was quietly humming along on its 24-7 duty, she got two bites in a couple of hours.

Originally made as a surveillance trap for the mosquito control professionals who monitor the location and number of the pests in order to kill them, the Mosquito Magnet attempts to crash the bug population by luring female mosquitoes toward what they think will be a blood meal. When they draw near, the machine vacuums them into a bag where they suffocate. After six or eight weeks, absent the females, who suck blood to provide protein to their eggs, the population dwindles.

The machine uses platinum beads to catalytically convert propane gas into carbon dioxide, which mimics the exhalations of humans and other large mammals. The CO₂ mingles in a plume with heat, octanol attractant and moisture. As the females reach the machine's tube, they realize, because they are frighteningly smart little buggers, they are about to be cheated out of their blood meal. Instinctively, they turn upwards and try to move on, but the vacuum sucks them to their dehydrating demise.

The U.S. Coast Guard used Mosquito Magnets to reclaim its uninhabitable Bahamian station, and six of the contraptions captured 1.5 million mosquitoes in six days, according to the manufacturer. But some experts, those folks who subscribe to the Journal of the American Mosquito Control Association, aren't so sure.

"We don't endorse it. We don't think there's enough data," says Cyrus Lesser, chief of mosquito control for Maryland, which has led the nation in cases of mosquito-borne West Nile virus in birds. "If you wind up with tons of mosquitoes in the trap, it just means you had a lot of mosquitoes to begin with. I've visited sites and looked at the traps and been bitten on the way to the trap and right next to the trap. 'Pest perception,' says Lesser. 'It's all about pest perception.'"

The only good mosquito is a dead mosquito.

Probably 65 million years old and hardy as the devil, mosquitoes are all take, take, take. They suck blood, leaving nothing behind but welts and a trail of miserable death. Evolutionary scientists have studied them for years to determine what use the insects have in the Big Scheme of Things. The answer: None. Or perhaps this: "To teach us humility," suggests Rick Wilkerson, an entomologist at the Walter Reed Army Institute of Research.

Worldwide, homicidal mosquitoes claim more than a million victims a year to malaria alone; another 300 to 500 million fall ill but recover. Then there are encephalitis and dengue fever, which people in the tropics call "broken-bone disease" because the victim feels as if every bone in his body

has been broken. Dengue fever afflicted some 400,000 people in Brazil last year. And now there's West Nile virus, a spreading threat in the United States. Discovered in this hemisphere only in 1999, it is known to have killed 18 people so far.

Back in the '60s, before we were so terrified of everything around us, when teenagers baked for days under the hot swimming pool sun and all the moms smoked and additives were wonder substances, not carcinogens, there was a truck called the Skeeter Beater. It would roll slowly through the streets of Levittown, Pa., and all the kids would tear out of all the houses and chase the Skeeter Beater down the street, playing and laughing in the thick and noxious cloud of pesticide.

Chemicals have a bad name now. People are afraid of pesticides, when they should be afraid of mosquitoes. They prefer to slather themselves with botanical repellents instead of DEET, the proven chemical bug slayer. Meanwhile, they refuse to patrol their grounds for standing water, which is what mosquitoes need to hatch their eggs. They won't clean their gutters or empty the water out of their trash can lids or flowerpot saucers. They won't flush their birdbaths or dump out their kids' wading pools.

The environmentalists among them do quaint things like put up bat houses and condos for purple martins.

"Bats have really good press agents for promoting them for mosquito control, but they are not very effective," says Lesser. They prefer moths and can spread rabies. Neither are the purple martins huge skeeter eaters. One of the more pestiferous facts about mosquitoes is that they are not a predator's primary source of food. They exist as a sort of snack. Fish can be heavy snackers. Without the fish, says Lesser, "you wouldn't need to build a bridge to the Eastern Shore, because nobody would want to go there."

They are frighteningly adaptable. In one of those environmentally friendly maneuvers that went horribly wrong, the vicious Asian tiger mosquito traveled to this country in the mid-'80s inside shipments of tires imported for recycling, because Asian tires have higher rubber content. By the time the Centers for Disease Control and Prevention knew manufacturers were inadvertently importing exotic pests and took quarantine measures, it was too late. Now, in an extraordinarily efficient colonization, *Aedes albopictus*, with its distinctive white and silver stripes, swarms through nearly every state.

"They are very aggressive and painful biters, and most people have severe itching and swelling for several days," Lesser says. They won't wait for night, but dive for the ankles in broad daylight. Worse, last year the Asian tigers were discovered to be fine spreaders of West Nile virus, adding to an already impressive list of diseases—dengue, eastern equine encephalitis and dog heartworm, and potentially St. Louis and La Crosse encephalitis.

Mosquitoes don't fight fair. They prey on the still, and the sleeping. There is something enraging and satisfying about killing a mosquito, and thinking that the red smear on the wall may be made up of your own stolen platelets and plasma.

Sometimes they have accomplices. The knock comes at the door. It's the friendly mosquito control man, offering some educational tips about the standing water that breeds the mosquitoes traveling to the neighbors' yards. "And the person says, 'That's good. I don't like my neighbors,'" says Lesser. "There are sociopaths in all walks of society."

After more than 30 years fighting the killer bugs, he has grown philosophical. "It has to do with what you are willing to put up with," he says. "I personally have given up and surrendered to the theory of chaos. Everything is unordered, and you just try to get through the best you can."

But that man is not Ray Iannetta's customer.

Iannetta's customer is a man like Rick Young, of Angus, Ontario, who wrote this testimonial: "In the spring of 2001, I told my wife, 'I'm going to find a way to reclaim our property. This was war, and I was tired of always being a prisoner in my own house.'"

Mosquito Magnet owners are people who still believe terror can be controlled by precision killing. They measure their satisfaction in enemy body count. All casualties are more than acceptable.

"You know one of the funniest things we hear from our customers? We put the [trapped] mosquitoes in a net so you can see them," says Iannetta, "and people complained the window wasn't big enough. They like to go out at night. They keep a flashlight on the table. They go outside and see how many they've caught. They love seeing them, clinging to the net, suffocating."

More than 150,000 Mosquito Magnets have been sold in the past few years, despite their hefty price tag. This summer, sales are up 400 percent for the machine.



AMERICAN BIOPHYSICS CORP.

MOSQUITO PHOTO BY ROBERT F. BUCKLEY—ASSOCIATED PRESS

See SKEETERS, F3, Col. 1

The Buzz About Mosquito Trappers

By ADRIAN HOGGINS
Washington Post Staff Writer

Big scientists studying mosquitoes have used devices for years to lure the maddening, blood-sucking insects. The main attractant was dry ice—which produces carbon dioxide, the same gas found in human breath.

A group of scientists and entrepreneurs at an East Greenwich, R.I., company figured that if someone could adapt these research instruments to lure and kill mosquitoes in back yards, consumer demand would be phenomenal. Three years ago, the company, American Biophysics Corp., introduced its first model. Since then, the device has been attracting more than just a swarm of skeeters.

The company essentially created a new consumer category, which is now growing at 400 percent a year according to the head of American Biophysics, and drawing widespread media coverage. The marketplace is becoming crowded with similar traps in a wide range of prices, promising to rid our yards and gardens of the irritating and potentially dangerous parasites.

Most of these devices, functioning rather like sacrificial robots, seek to mimic human beings by emitting plumes of carbon dioxide, heat and compounds found in human (and bovine) breath. One product even recreates the sound of a beating heart. "People are very skeptical of any mosquito-abatement product," said Juliana Lear, spokeswoman for American Biophysics. "People have been burned by zappers and citronella plants."

The products are confusing, the claims ambitious, and there is little in-

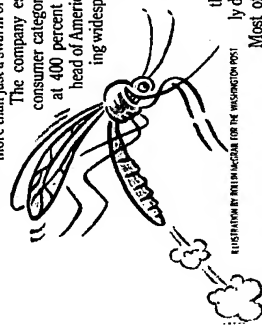


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See MOSQUITOES, Page 6

A Myriad of Mosquito Traps

MOSQUITOES. From Page 1

dependent research to guide the consumer. But with the contraptions typically costing several hundred dollars—and up—it seems reasonable to ask: Do they work?

"These devices will trap and kill measurable numbers of mosquitoes," says the nonprofit American Mosquito Control Association. "Whether this will produce a noticeable reduction in the mosquito population in your case will depend."

The association, based in Eatontown, N.J., urges consumers not to expect miracles. "Please be cautioned against putting too much faith in traps as your sole means of control," states its Web site, www.mosquito.org.

Alan Kerbey owns Specialty Chemical Applications, a pest control company in bug-infested South Texas and has evaluated the array of new devices. His take: They work, some much better than others, but none will completely eradicate the insect. "The consumer is totally confused. These companies have Web sites promising to eliminate mosquitoes in your yard forever. It's just not happening, and a lot of people are disappointed," he said.

For decades, the battle for your yard in summer came down to chemical warfare—spraying DDT on your skin, burning citronella, logging the air with pesticides. The notion of a clean, high-tech and remote trap has captured the public imagination, and manufacturers are looking to the day soon when these electronic offerings are as common as gas grills, which they resemble.

The demand has been boosted by fears surrounding the spread of the West Nile virus and other mosquito-borne illnesses, which can be fatal to people with weakened immune systems.

Alexandria health officials announced last week that two dead crows tested positive for the West Nile virus. They recorded 70 bird deaths from mosquitoes last year.

This summer, the consumer will find a number of electronic mosquito-killers, both online and in hardware and home product stores. Check Web sites for more information.

American Biophysics sells two commercial-grade products, the Mosquito Magnet Pro (\$1,295) and Freedom (\$795). This year, the company introduced the Liberty at \$495, designed specifically for back yards. It relies on a 12-volt power cord to run the fan that sucks in the mosquitoes to a bag, where they dehydrate and die. The other two generate their own electricity and can be used in remote places like golf courses. The company says the range of the Pro model is up to an acre—the other two are designed to lure and trap mosquitoes over an area up to three-quarters of an acre.

All three use octenol and standard propane gas tanks with catalytic converters to change the propane into carbon dioxide (www.mosquitomagnet.com).

Dragonfly Mosquito System, by BioSensory Inc. of Williamst, Conn. The company sells the Dragonfly, which also emits heat and octenol but delivers its carbon dioxide directly and advises using it with two of its Mosquito Cognito devices, which emit a chemical named Concoal to mask human smells. The system costs \$795, but the addition of a portable stand and CO tank increases the price to \$992 (www.biosensory.com).

Mosquito PowerTrap, by Flowtron Outdoor Products, a division of Amatron International Inc. of Melrose, Mass. This device has the same basic features as the Mosquito Magnet Liberty and lists for \$369 to \$399 (www.mosquitopowertrap.com).

American Biophysics last year sued Amatron in U.S. District Court claiming patent infringements. Amatron has denied the allegations. The suit has been stayed pending a reexamination of the companies' various patents.

Mosquito Deleto, made by the Coleman Co. of Wichita, Kan. The Beck Home model runs off a standard propane tank or a camp-stove-type propane canister and sells for \$249.99. The manufacturer recommends use of a repellent device called Inhibitor, which costs \$22.95. (On Monday, the Consumer Product Safety Commission

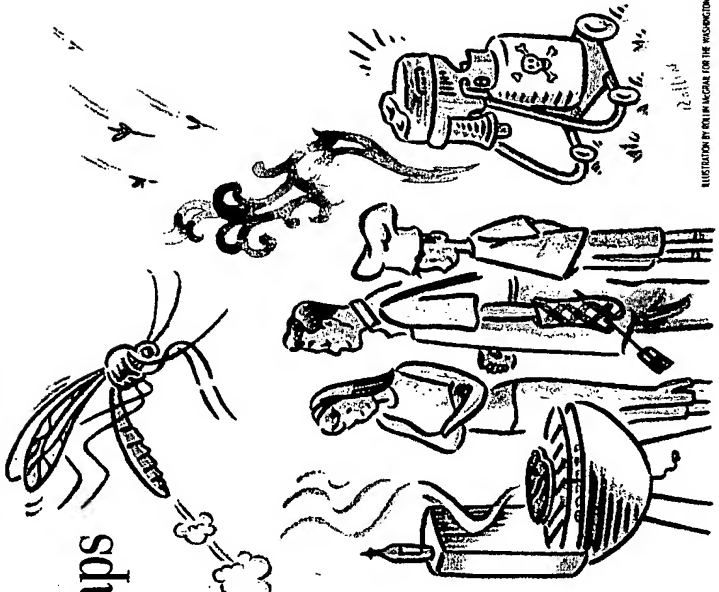


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announced a voluntary recall of 136,000 Mosquito Deletos sold since March because of reports of propane leaks that could pose a fire hazard. Customers can call 800-257-5299 or log on to www.coleman.com.

SonicWeb, by Applica Consumer Products Inc. of Shelton, Conn. It uses heat, visual attractants, octenol and the sound of a heartbeat to lure the insects, which are then caught on sticky paper. It sells for \$299.85 (www.sonicweb.com).

Mosquito Trap by Lenet International Inc., based in Orlando. The trap converts propane into moisture and carbon dioxide to help attract mosquitoes. It also incorporates heat, color, air flow and special attractant blue light to lure and capture mosquitoes more effectively. It lists for \$299.99. Lenet also has a repellent device called Bite Shield, which uses the aroma of a natural oil called geraniol, extracted from lemongrass, primarily to repel biting insects, for \$19.99.

trapped as many as 22,443 biting insects per night during an eight-day trial in Florida.

Kerbey said another model he has used, from Australia, kept shorting out in rain. He favors a product called Mosquito Terminator, which is being marketed on the Internet by its inventor, Jose Trevino of Houston (www.mosquitoterminator.com).

Consumers also must choose between contraptions that use CO₂ directly, or employ a catalytic converter to produce the gas from standard, 20-pound propane tanks. In both cases, you have to replace the gas bottles as they run out. The distribution network for CO₂ is much smaller than for propane—typically welding supply companies where customers not only must buy the carbon dioxide but rent a tank if they don't own one.

In addition to replacing the gas, consumers must replace depleted octenol and, in systems that have them, the adhesive traps.

Kerbey said the machines would be most effective if everyone in a neighborhood had one. Those living on the fringes, though, would still get mosquitoes from unprotected areas. And after heavy rains induce population explosions of the insect, the machines are unlikely to clear your yard. They would be useful as part of a multi-pronged attack that included larvicidal dunks in ponds and chemical treatment of infested areas, he said.

South Texas is a hot spot for biting insects, but so too, Kerbey noted, are the salt marshes of the Chesapeake Bay.

Raymond Iannella, president of American Biophysics, acknowledged that after a "blow" of salt marsh mosquitoes, spurred by a high, soaking tide, it would take a week for his product to "take down" the infestation "to where you could stay in your yard."

But he noted too that the U.S. Coast Guard had been planning to abandon a Caribbean island before testing the Mosquito Magnet, and employees went from wearing netting and chemically impregnated clothing "to sunbathing."



MOSQUITO MAGNET®
Fatal Attraction for Mosquitoes

MOSQUITO MAGNET® INDEPENDENT STUDIES FACT SHEET

CAYMAN ISLANDS MOSQUITO RESEARCH & CONTROL UNIT, CAYMAN ISLANDS (JULY 2002)

Abstract:

- The Mosquito Magnet® Liberty was tested against the Coleman Mosquito Deleto™ and the Applica SonicWeb™ over a nine-day period in a mosquito infested mangrove swamp in the Cayman Islands.

Results:

- The Mosquito Magnet® Liberty caught 7,161 mosquitoes, nearly 200 times more mosquitoes than Coleman's Mosquito Deleto™, which caught 37 mosquitoes. The SonicWeb™ caught only five.
- The Mosquito Magnet® Liberty caught nine mosquito species, which is 300% more than the other traps tested.
- In further testing in an urban area with a relatively low mosquito population, the Liberty trapped 286 mosquitoes over a 17-day period compared to only five trapped by the Mosquito Deleto™. The SonicWeb™ was not tested in the urban setting due to the lower number of mosquitoes collected in the area with a dense mosquito population.

FLORIDA A&M UNIVERSITY, PUBLIC HEALTH ENTOMOLOGY RESEARCH & EDUCATION CENTER, PANAMA CITY, FLORIDA (SUMMER 2001 AND SUMMER 2002)

(2001)

Abstract:

- The Mosquito Magnet® Pro was tested against the Flowtron Inc. Mosquito PowerTrap (also known as the Mosquito Eliminator) in a tropical salt marsh in Panama City, Florida.
- Traps were randomly assigned to four sites separated by distances of at least 300 ft., and operated for 16 hours.

Results:

- The Mosquito Magnet® Pro captured 10 times more mosquitoes than the Mosquito PowerTrap.

(2002)

Abstract:

- In a second test, the mosquito-capturing prowess of the Mosquito Magnet® Liberty was tested against seven other commercial traps on the market including the Mega-Catch™ and the SonicWeb™.

Results:

- The Mosquito Magnet® Liberty out caught four of the commercial models by 6 to 1 and it out caught the other models by at least 2.5 to 1.
- The Liberty also captured more species of mosquitoes than any other trap tested.

DR. L.R. TAYLOR, TAYLOR ENVIRONMENTAL AND BIOLOGICAL SPECIALISTS
Holiday Township, Marloth Park, Eastern Mpumalanga, RAS
(July 2002)

Abstract:

- The efficacy of the Mosquito Magnet® Pro was examined in the eastern Mpumalanga province of South Africa in less desirable winter conditions over a period of 6 days.
- The Mosquito Magnet® Pro was placed in two localities, a mixed woodland area with standing water in close proximity and a developed commercial facility comprising of a restaurant with an open deck overlooking a swimming pool and game watering hole.

Results:

- The Pro successfully captured biting midges and mosquitoes from six different taxa in limiting winter conditions. This suggests that the unit will be highly effective in spring, summer and autumn conditions.
- The capture rate for the Mosquito Magnet® Pro proves its ability to attract biting insects.
- The unit is able to capture taxa in proportion to that found to land on and bite human hosts. In addition, mosquito landing and biting rates diminish in the presence of the operating machines.

STUDY BY DR. JEFFERY VAUGHN, DEPARTMENT OF BIOLOGY,
UNIVERSITY OF NORTH DAKOTA, GRAND FORKS NORTH DAKOTA (SUMMER 2002)

Abstract:

- The study examined the capturing ability of the Mosquito Magnet® Pro and Liberty versus the New Jersey light trap over a 44-day period in two similar residential neighborhoods.

Results:

- The Mosquito Magnet® trap caught 20 to 30 times more mosquitoes than the New Jersey light trap.
- The Mosquito Magnet® reduced biting intensity in treated neighborhoods under certain conditions.

U.S. ARMY MEDICAL COMMAND, THE CENTERS FOR DISEASE CONTROL, REPUBLIC OF KOREA (SUMMER 2000)

Abstract:

- Field tests of seven different mosquito traps were conducted where recent outbreaks of malaria had occurred near the U.S. base at Camp Greaves in South Korea.
- The tests were conducted in areas that hadn't been sprayed and that had large known populations of mosquitoes.

Results:

- According to the *Journal of the American Mosquito Control Association, September 2001*, the Mosquito Magnet® captured three times more mosquitoes than the next most effective trap, and over 13 times as many as others - even other traps that use CO₂ and octenol attractants.

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